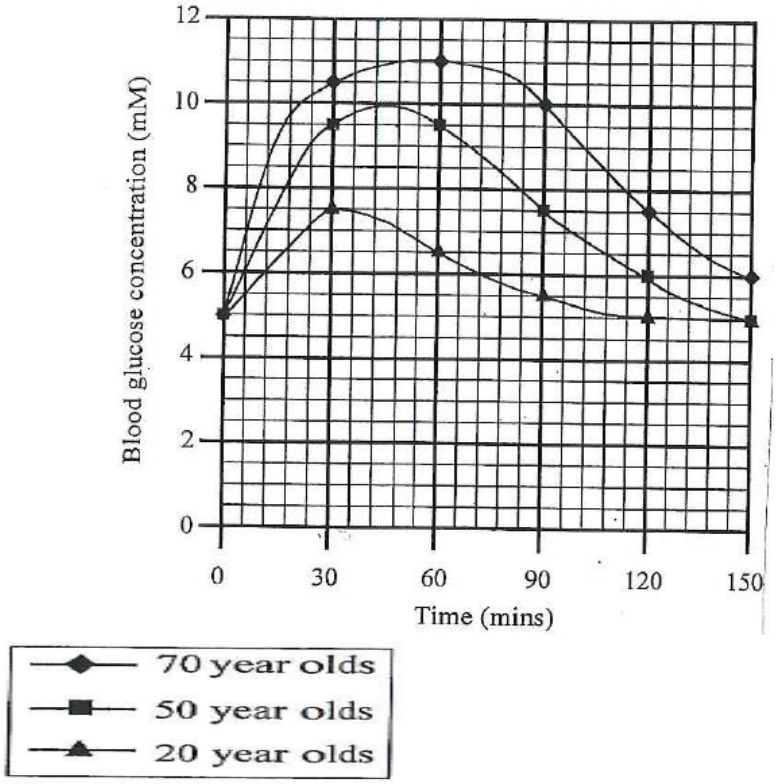
1. High levels of blood glucose can cause clouding of the lens in the human eye. Concentrations above 5.5mM are believed to put the individual at a high risk of lens damage.
In an investigation, subjects of different ages each drank a glucose solution. The concentration of glucose in their blood was monitored over a number of hours. The results are shown in the graph below.



For how long during the investigation did 20 year olds remain above the high risk blood glucose concentration?

A 84 mins
B 90 mins
C 120 mins
D 148 mins

2. The ratio of high-density lipoproteins to low-density lipoproteins in the blood (HDL:LDL) is related to the level of cholesterol in the blood. This in turn can influence the chances of developing atherosclerosis.

Which line in the table below correctly illustrates these relationships?

	HDL:LDL	Cholesterol Level	Chance of atherosclerosis
A	High	Low	Reduced
B	High	High	Increased
C	Low	Low	Increased
D	Low	High	Reduced

3. Which of the following pairs of compounds is produces by the pancreas?

A Glycogen and insulin

B Insulin and ADH

C Insulin and glucagon

D Glycogen and glucagon

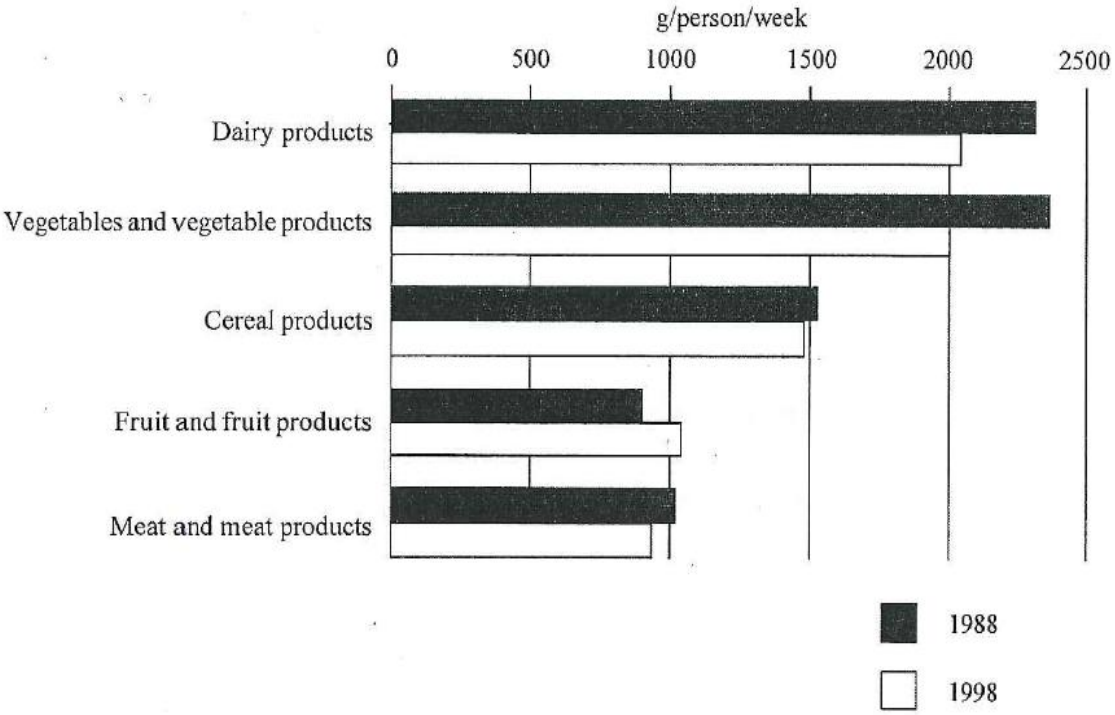
4. The flow chart below shows the concentration in the blood is regulated.

Blood glucose Concentration rises → Pancreas secrets less of compound **X** and more of compound **Y** → Liver converts glucose to insoluble carbohydrate → Blood glucose concentration falls.

Which line identifies correctly the compound X and Y

	Compound X	Compound Y
A	glycogen	insulin
B	insulin	glycogen
C	glucagon	insulin
D	insulin	glucagon

5. The graph below shows how the UK diet changed between 1988 and 1998.



\

A People ate more food in 1998 than in 1988
B People ate less food in 1998 than in 1988
C People ate a greater variety of food in 1998 than in 1988
D people ate a lesser variety of food in 1998 than in 1988

6. Two men (P and R) were being tested for diabetes mellitus, a condition which results in failure to control blood glucose concentration.
After fasting overnight, they were given a large glucose drink. Their blood glucose concentration was measured immediately (0 hours) and then every hour five hours.

The results of the tests are shown in the table below.

	Time after drinking glucose (hours)					
	0	*1*	*2*	*3*	*4*	*5*
Blood glucose concentration of P (mg/100 ml)	145	210	190	180	170	160
Blood glucose concentration of R (mg/100 ml)	90	125	90	85	90	90

(a) It was concluded that P had diabetes and R did not.

(i) State **two** ways in which the test results indicate that P had diabetes**.**

1_____

2_____

(1 mark)

(ii) Name the hormone responsible for the change in the blood glucose concentration of **R.**

Between 1 and 2 hours_____

Between 3 and 4 hours_____

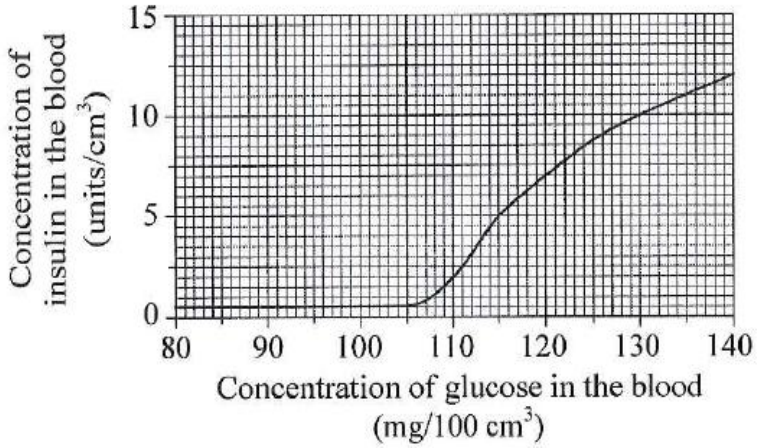
(1 mark)

7. The graphs below contain information about the regulation of blood sugar.

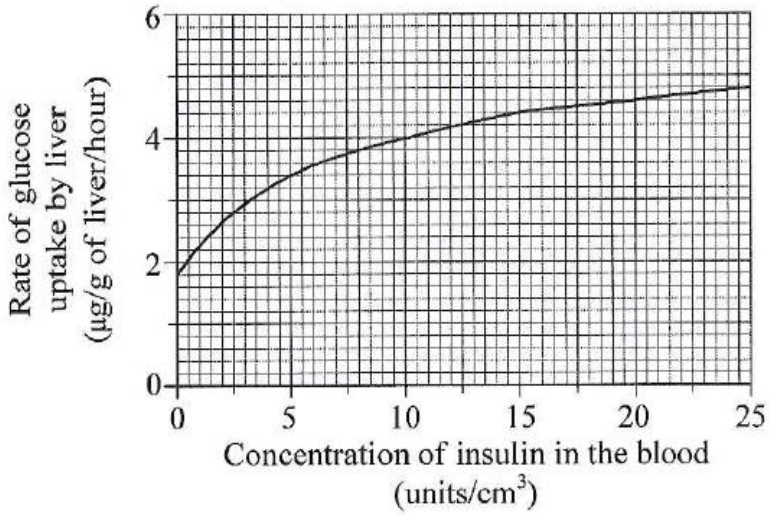
Graph 1 shows how the concentration of glucose in the blood affects the concentration of insulin.

Graph 2 shows how the concentration of insulin in the blood affects the rate of glucose uptake by the liver.

Graph 1



Graph 2



increase in insulin production.

_____ (1 mark)

(ii)Name the organ which produces insulin

_____ (1 mark)

(b) From **Graph 2** calculate the percentage increase in the rate of glucose uptake by the liver when the concentration of insulin in the blood rises from 10 to 15 units/cm^3

Space for calculation

_____(1 mark)

(c) From **Graphs 1** and **2,** state the rate of glucose uptake by the liver when the concentration of glucose in the blood is 130mg/100cm^3

_____ug/g of liver/hour (1 mark)

8. The table below contains information about diagnosed cases in the four countries of the UK in 2008

Country	**Population (million)**	**Individuals diagnosed with diabetes (% of population)**
England	51.3	3.9
Scotland	5.4	3.7
Wales	3.2	4.4
Northern Ireland	1.8	3.4
Total	**61.7**	

(a) Use the date in the table to calculate the number of individuals in the Scottish population who had diabetes in 2008.

Space for calculation

_____(1 mark)

(b) A student calculated the percentage of the UK population that had been diagnosed with diabetes by averaging the percentage values in the table.

Suggest why this average is likely to misrepresent the true percentage of people in the UK who have been diagnosed with diabetes.

_____

_____

(1 mark)

(c) It has been suggested that the number of people in the UK with diabetes will double by the year 2030.

Suggest **two different** ways in which the current UK government might use this information to plan for the future.

1_____

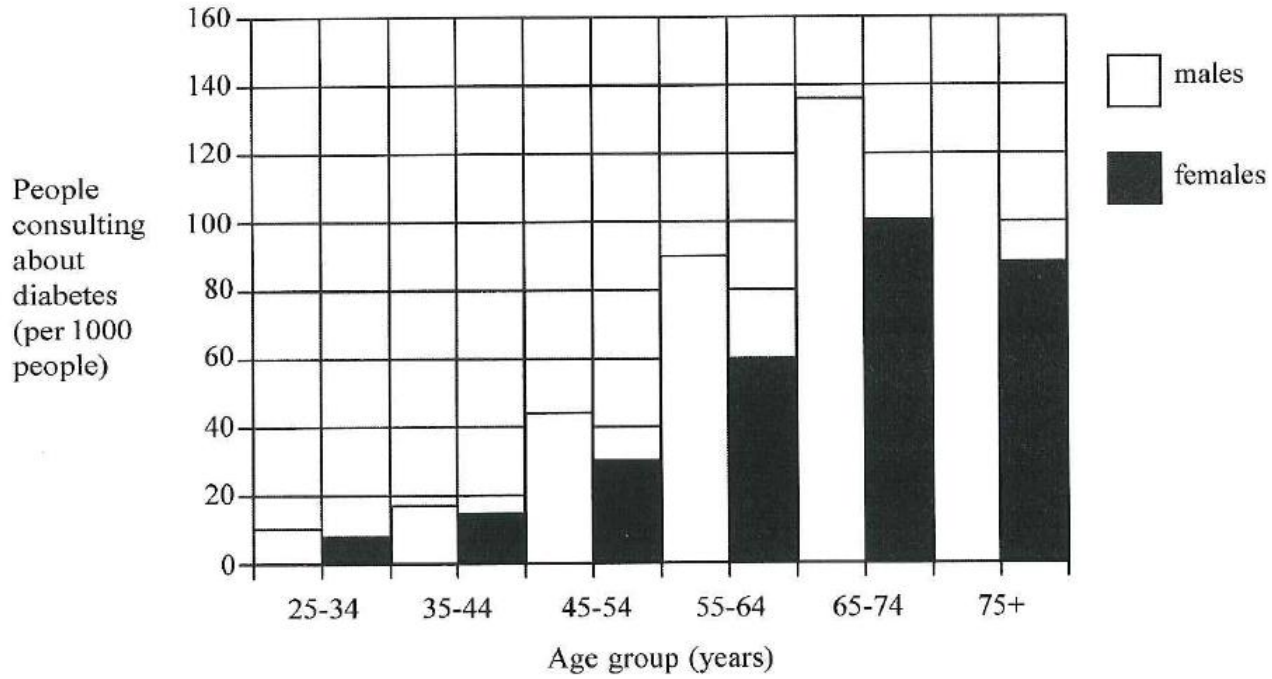
_____

2_____

_____

(1 mark)

(d) The graph below contains information about the number of people in Scotland who consulted their doctor about diabetes in 2008.



Age_____

Gender_____

(1 mark)

(ii) In a Scottish city 2500 men between 45 and 54 years of age visited their doctor in 2008.

Use the graph to calculate how many of these men would be consulting their doctors about diabetes.

Space for calculation

_____ (1 mark)

(iii) Calculate the percentage decrease in the number of men consulting their doctor between the 65-74 age group and the 75+ age group.

Space for calculation

_____%
(1 mark)

(e) (i) Type 1 diabetics are unable to produce enough insulin.

Where is insulin produced in the body?

_____
(1 mark)

(ii) Describe the role of insulin in the liver

_____ (1 mark)

9. (a) Give **ONE** difference between a person suffering from Type 1 diabetes and Type 2 diabetes

_____

_____
(1 mark)

(b) An individual with diabetes and one without diabetes take a glucose drink after a period of fasting. Their blood glucose concentrations are shown in the table below.

Time (mins)	**Blood glucose concentration of individual without diabetes (mmol/l)**	**Blood glucose concentration of individual with diabetes (mmol/l)**
0	2	3
30	9	12
60	5	14
90	4	16
120	4	13

(i) State the blood glucose concentrations of the two individuals after 90 minutes as a simple whole number ratio.

Answer_____
(1 mark)

(i) Predict the blood glucose concentrations of the individual with diabetes after 120 minutes.

Answer _____
(1 mark)

(ii) Give a reason for your answer to (i).

Reason_____ (1 mark)

(iii) What is the function of low density lipoproteins (LDP)

_____
(1 mark)

(iv) Name a drug which can be used to reduces blood cholesterol levels and explain its action.

Name_____

Action_____
(1 mark)

10. Elevation of blood glucose levels leads to certain cells taking in more glucose than normal damaging the blood vessels.

(i) What is the name of these cells?_____
(1 mark)

(ii) Receptor cells in the pancreas respond to (a) high and (b) low blood glucose levels by causing secretion of hormones.

(a) Name the hormone produced for high blood glucose levels:

_____(1 mark)

(b) Name the hormone produced for low blood glucose levels:

_____(1 mark)

(iii) Describe exercise and fight or flight response another hormone is produced. Name this hormone, where it is released from, and explain its mode of action.

Name of hormone_____

Released from:_____

Mode of action_____
(3 marks)

11. Some of the reactions involved in the formation of a blood clot are shown below:

Fibrinogen ⟶ ***Fibrin*** ⟶ ***Blood clot***

(a) What is the term used to describe a blood clot?

_____ (1 mark)

(b) Name the enzyme which converts fibrinogen into fibrin.

_____ (1 mark)

(c) What is an embolis?

_____ (1 mark)

(d) Explain why the formation of a clot in an artery in the brain can lead to a stroke.

_____(1 mark)

(e) Explain what DVT is and give a reason why it can be harmful.

Explanation_____
(1 mark)

Reason_____
(1 mark)

12. (i) What is meant by the term hypercholesterolemia?

_____(1 mark)

(ii)Cholesterol is found normally in the body.

What is the function of cholesterol _____
(1 mark)

(iii)What is the function of high density lipoproteins (HDL)

_____

(1 mark)

13. Discuss how cardiovascular disease occurs. (10)

1	(Results of) cardiovascular disease include angina/stroke/heart attack/hypertension or high blood pressure/peripheral vascular disease. ***Any 2 mentioned***	**1**
2	Atherosclerosis is build-up of cholesterol/calcium/fatty/fibrous material in an artery.	**1**
3	Low density lipoproteins/LDLs transport cholesterol to the arteries.	**1**
4	An atheroma/plaque forms beneath the endothelium/lining of artery.	**1**
5	Artery thickens/hardens/loses elasticity/narrows.	**1**
6	Blood pressure increases / hypertension develops.	**1**
7	Atheromas can rupture and clotting factors are released.	**1**
8	Formation of a clot / thrombus occurs or thrombosis occurs.	**1**
9	The clot/thrombus can break loose forming an embolus.	**1**
10	This can block arteries (causing a stroke/heart attack).	**1**
11	Cells are deprived of oxygen.	**1**
12	A deep vein thrombosis (can occur) **or** DVT is a clot in a vein.	**1**
13	High blood glucose levels/diabetes can cause cardiovascular disease.	**1**

Any 8

The coherence and relevance marks are only awarded when at least five marks have been scored from points 1 to 13 and the following criteria are met.

Relevance – A single short reference to an irrelevant point is not penalised but development of the point is penalised. However, two irrelevant points without development are penalised. For example, mention of two or more of the following will lose this mark:

structure and function of the heart, cardiac cycle, cardiac conducting system, measuring blood pressure. **1**

Coherence – Response should contain paragraphs/subheadings, have a logical sequence and be written in sentences (not bullet points). **1**

Total 10

Circulation 2